CLAIMS

1. (Withdrawn) A method of producing a cell-permeable osteoinductive polypeptide comprising introducing into a suitable host cell an expression construct comprising: a) a polynucleotide encoding a cell-permeable polypeptide; b) a polynucleotide encoding an osteoinductive polypeptide operably linked to the cell-permeable polypeptide and positioned so that the osteoinductive polypeptide is expressed as part of a fusion protein with the cell-permeable polypeptide; c) a promoter positioned to direct transcription of the polynucleotides.

2. (Withdrawn) The method of claim 1 wherein the expression construct further comprises a purification tag.

3. (Withdrawn) The method of claim 1 wherein the cell-permeable polypeptide is chosen from the group consisting of HIV-TAT, VP-22, a growth factor signal peptide sequence, Pep-1, and a Drosophila Antp peptide.

4. (Withdrawn) The method of claim 1 wherein the cell-permeable polypeptide is an HIV-TAT protein transduction domain.

5. (Withdrawn) The method of claim 1 wherein the osteoinductive polypeptide is chosen from the group consisting of LMP-1, LMP-3, SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 3, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8, BMP-2, BMP-4, BMP-6, BMP-7, TGF-beta 1 and Smad.

6. (Withdrawn) The method of claim 1 wherein the osteoinductive polypeptide is chosen from the group consisting of LMP-1, LMP-3, SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 3, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, and SEQ ID NO 8.

7. (Previously presented) A method of inducing bone formation in a mammal comprising administering an effective amount of a fusion polypeptide comprising a protein transduction domain and an osteoiductive polypeptide comprising at least one isolated osteoinductive region of an LMP-1 protein, wherein the osteoinductive polypeptide has less than 100% homology to

LMP-1, RLMP, and LMP-1s.

8. (Original) The method of claim 7 wherein the protein transduction domain is chosen from the group consisting of HIV-TAT, VP-22, a growth factor signal peptide sequence, Pep-i, and a Drosophila Antp peptide.

9. (Original) The method of claim 7 wherein the protein transduction domain is an HIV-TAT protein transduction domain.

10. (Previously presented) The method of claim 7 wherein the osteoinductive polypeptide is chosen from the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8 and combinations thereof.

11. (Previously presented) The method of claim 7 wherein the osteoinductive polypeptide comprises SEQ ID NO 7, or SEQ ID NO 8.

12. (Original) The method of claim 7 wherein the fusion polypeptide is administered as an implant.

13. (Original) The method of claim 7 wherein the fusion polypeptide is administered by hydrogel.

14. (Original) The method of claim 7 wherein the fusion polypeptide is administered to at least one multipotent progenitor cell.

15. (Original) The method of claim 14 wherein the at least one multipotent progenitor cell is implanted into the mammal.

16. (Withdrawn) A polynucleotide encoding a fusion protein comprising a protein transduction domain and at least one osteoinductive polypeptide.

17. (Withdrawn) The polynucleotide of claim 16 wherein the protein transduction domain is chosen from the group consisting of HIV-TAT, VP-22, a growth factor signal peptide sequence, Pep-1, and a Drosophila Antp peptide.

18. (Withdrawn) The polynucleotide of claim 16 wherein the protein transduction domain is an HIV-TAT protein transduction domain.

19. (Withdrawn) The polynucleotide of claim 16 wherein the osteoinductive polypeptide is chosen from the group consisting of LMP-1, LMP-3, SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO3, SEQ ID NO4, SEQ ID NO5, SEQ ID NO6, SEQ ID NO7, SEQ ID NO 8, BMP-2, BMP-4, BMP-6, BMP-7, TGF-beta 1 and Smad.

20. (Withdrawn) The polynucleotide of claim 16 wherein the osteoinductive polypeptide is chosen from the group consisting of LMP-1, LMP-3, SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 3, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, and SEQ ID NO 8.

21. (Previously presented) A method of inducing proteoglycan synthesis in a mammal comprising administering an effective amount of a fusion polypeptide comprising a protein transduction domain and an osteoiductive polypeptide comprising at least one isolated osteoinductive region of an LMP-1 protein, wherein the osteoinductive polypeptide has less than 100% homology to LMP-1, RLMP, and LMP-1s and wherein the proteoglycan concentration prior to said administering step is less than said concentration post said administering step.

22. (Original) The method of claim 21 wherein the protein transduction domain is chosen from the group consisting of HIV-TAT, VP-22, a growth factor signal peptide sequence, Pep-1, and a Drosophila Antp peptide.

23. (Original) The method of claim 21 wherein the protein transduction domain is an HIV-TAT protein transduction domain.

24. (Previously presented) The method of claim 21 wherein the osteoinductive polypeptide is

chosen from the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8 and combinations thereof.

25. (Previously presented) The method of claim 21 wherein the osteoinductive polypeptide comprises SEQ ID NO: 7 or SEQ ID NO: 8.

26. (Original) The method of claim 21 wherein the fusion polypeptide is administered as an implant.

27. (Original) The method of claim 21 wherein the fusion polypeptide is administered by hydrogel.

28. (Original) The method of claim 21 wherein the fusion polypeptide is administered to at least one multipotent progenitor cell.

29. (Original) The method of claim 21 wherein the at least one multipotent progenitor cell is implanted into the mammal.

30. (Original) The method of claim 21 wherein the proteoglycan is aggrecan.

31. (Withdrawn) An isolated fusion polypeptide comprising a membrane-translocating peptide operably linked to an osteoinductive polypeptide.

32. (Withdrawn) The method of claim 31 wherein the membrane-translocating peptide is chosen from the group consisting of HIV-TAT, VP-22, a growth factor signal peptide sequence, Pep-1, and a Drosophila Antp peptide.

33. (Withdrawn) The method of claim 31 wherein the membrane-translocating peptide is an HIV-TAT protein transduction domain.

34. (Withdrawn) The method of claim 31 wherein the osteoinductive polypeptide is chosen from

the group consisting of LMP-1, LMP-3, SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 3, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8.

35. (Withdrawn) The method of claim 31 wherein the osteoinductive polypeptide comprises LMP-1, LMP-3, SEQ ID NO 7, or SEQ ID NO 8.

36. (Previously presented) A method of inducing osteoblast differentiation in a progenitor cell, the method comprising administering to the progenitor cell an effective amount of a fusion polypeptide comprising a protein transduction domain and an osteoiductive polypeptide comprising at least one isolated osteoinductive region of an LMP-1 protein, wherein the osteoinductive polypeptide has less than 100% homology to LMP-1, RLMP, and LMP-1s and wherein the differentiated osteoblast concentration prior to said administering step is less than said concentration post said administering step.

37. (Original) The method of claim 36 wherein the protein transduction domain is chosen from the group consisting of HIV-TAT, VP-22, a growth factor signal peptide sequence, Pep-1, and a Drosophila Antp peptide.

38. (Original) The method of claim 36 wherein the protein transduction domain is an HIV-TAT protein transduction domain.

39. (Previously presented) The method of claim 36 wherein the osteoinductive polypeptide is chosen from the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8 and combinations thereof.

40. (Previously presented) The method of claim 36 wherein the osteoinductive polypeptide comprises SEQ ID NO 7, or SEQ ID NO 8.

41. (Withdrawn) An osteoinductive polypeptide chosen from among the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 3, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, and SEQ ID NO 8, or combinations thereof.

42. (Cancelled)

43. (Cancelled)

44. (Previously presented) The method of claim 7, wherein the fusion polypeptide consists of a protein transduction domain and at least one isolated osteoinductive region of an LMP-1 protein.

45. (Previously presented) A method of inducing bone formation in a mammal comprising administering an effective amount of a fusion polypeptide consisting of a protein transduction domain and an amino acid sequence selected from the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8 and combinations thereof.

46. (Previously presented) The method of claim 21, wherein the fusion polypeptide consists of a protein transduction domain and at least one isolated osteoinductive region of an LMP-1 protein.

47. (Previously presented) A method of inducing proteoglycan synthesis in a mammal comprising administering an effective amount of a fusion polypeptide consisting of a protein transduction domain and an amino acid sequence selected from the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8 and combinations thereof, wherein the proteoglycan concentration prior to said administering step is less than said concentration post said administering step.

48. (Previously presented) The method of claim 36, wherein the fusion polypeptide consists of a protein transduction domain and at least one isolated osteoinductive region of an LMP-1 protein.

49. (Previously presented) A method of inducing osteoblast differentiation in a progenitor cell,

the method comprising administering to the progenitor cell an effective amount of a fusion polypeptide consisting of a protein transduction domain and an amino acid sequence selected from the group consisting of SEQ ID NO 1, SEQ ID NO 2, SEQ ID NO 4, SEQ ID NO 5, SEQ ID NO 6, SEQ ID NO 7, SEQ ID NO 8 and combinations thereof, wherein the differentiated osteoblast concentration prior to said administering step is less than said concentration post said administering step.